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**BEFORE THE BOARD OF PATENT APPEALS
AND INTERFERENCES**

Application Number: 09/540,955
Filing Date: March 31, 2000
Appellant(s): BUABBUD ET AL.

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GROUP 2800

Paul E. Franz
For Appellant

EXAMINER'S ANSWER

This is in response to the appeal brief filed 18 February 2005 appealing from the Office action mailed 11 August 2004. This Examiner Answer, following the new rules effective September 13, 2004, is revised according to the order of the Broad.

(1) Real Party in Interest

A statement identifying by name the real party in interest is contained in the brief.

(2) Related Appeals and Interferences

The examiner is not aware of any related appeals, interferences, or judicial proceedings which will directly affect or be directly affected by or have a bearing on the Board's decision in the pending appeal.

(3) Status of Claims

The statement of the status of claims contained in the brief is correct.

(4) Status of Amendments After Final

The appellant's statement of the status of amendments after final rejection contained in the brief is correct.

(5) Summary of Claimed Subject Matter

The summary of claimed subject matter contained in the brief is correct.

(6) Grounds of Rejection to be Reviewed on Appeal

The appellant's statement of the grounds of rejection to be reviewed on appeal is correct.

(7) Claims Appendix

The copy of the appealed claims contained in the Appendix to the brief is correct.

(8) Evidence Relied Upon

5,459,607	FELLOWS et al.	10-1995
5,491,575	NEIDLINGER et al.	2-1996
5,719,904	KIM	2-1998

5,896,211 WATANABE 4-1999

(9) Grounds of Rejection

The following ground(s) of rejection are applicable to the appealed claims:

Claims 3-4, 6-7, 10 and 12-20 are rejected under 35 U.S.C. 103(a) as being unpatentable over Fellows et al. (U.S. Patent 5,459,607) in view of Neidlinger et al. (U.S. Patent 5,491,575) and Kim (U.S. Patent 5,719,904).

Fellows et al. discloses in FIG. 1A and FIG. 1B a digital fiber transmission system comprising a local interface (first location) 2 and a remote location (second location) 4. The local interface transmits a Manchester coded signal having a first clocking frequency to remote location over an optical fiber using a wavelength. The remote location receives the signal and recovers the signal. The remote location converts a NRZ data to Manchester coded of second clock frequency and transmits the second Manchester signal to local interface over the same fiber using same wavelength (see col. 1, lines 39-40). Fellows et al. teaches to use 10 MHz for first clock frequency and 200 MHz for second clock frequency (see col. 5, lines 5-9). The local interface receives the second Manchester signal and converts it to NRZ. Regarding claims 3, 7 and 12-20, the difference between Fellows et al. and the claimed invention are (a) Fellows et al. does not transmits NRZ from local interface to remote location and (b) Fellows et al. does not include three (3) pulses for each data bit and use majority voting to determine the value of a received bit.

Neidlinger et al. teaches in FIG. 1 a system for transmitting bi-directional communication data over an optical fiber. Neidlinger et al. teaches to transmit NRZ (baseband) signal in one

direction and PSK (equivalent to Manchester) modulated signal in the other direction. This allows the use of high-pass filter and low-pass filter at the receiver side to filter out noise due to crosstalk. One of ordinary skill in the art would have be motivated to combine the teaching of Neidlinger et al. with the digital fiber transmission system of Fellows et al. because NRZ (baseband) signal and high speed Manchester signal have very little overlap in frequency spectrum and the approach of Neidlinger et al. further reduces crosstalk between signals of different directions. Thus it would have been obvious to one of ordinary skill in the art at the time the invention was made to transmit NRZ from local interface to remote location, as taught by Neidlinger et al., in the digital fiber transmission system of Fellows et al. because crosstalk between NRZ and high frequency Manchester is small.

Majority voting is a well-known simple error correction mechanism. Kim teaches in col. 1, lines 43-51 the basic concept of majority voting. One of ordinary skill in the art would have been motivated to combine the teaching of Kim with the modified bi-directional communication system of Fellows et al. and Neidlinger et al. because majority voting is a simple method for reducing errors. Thus it would have been obvious to one of ordinary skill in the art at the time the invention was made to use majority voting method, as taught by Kim, in the modified bi-directional communication system of Fellows et al. and Neidlinger et al. because majority voting is a simple method for reducing errors.

Regarding claim 4, Fellows et al. teaches a first clocking frequency of 10 MHz and Neidlinger et al. teaches a first clocking frequency of 70 MHz (see col. 4, lines 50-51 of Neidlinger et al.). It is obvious to one of ordinary skill in the art to choose any frequency in the

range 10 MHz~70 MHz, e.g., 25 MHz, in the modified bi-directional communication system of Fellows et al., Neidlinger et al. and Kim.

Regarding claims 6 and 10, Neidlinger et al. includes low pass filter TP in the central station and low pass filter LP in the decentralized station.

Claim 11 is rejected under 35 U.S.C. 103(a) as being unpatentable over Fellows et al., Neidlinger et al. and Kim as applied to claims 3-4, 6-7, 10 and 12-20 above, and further in view of Watanabe (U.S. Patent 5,896,211).

Fellows et al., Neidlinger et al. and Kim have been discussed above in regard to claims 3-4, 6-7, 10 and 12-20 above. Neidlinger et al. includes high pass filter in the second station between the modulator and the laser diode and band-pass filter BP in the first station between the photodiode and the discriminator. The difference between the modified communication system and method of Fellows et al., Neidlinger et al. and Kim and the claimed invention is that Neidlinger et al. uses high pass filter in the second station while the claimed invention uses band pass filter. Watanabe teaches in FIG. 10 the use of band pass filter after the modulation. It is well known in the art that the spectrum of a modulated signal is practically band limited. Using a band pass filter blocks noise outside the signal spectrum. Thus it would have been obvious to one of ordinary skill in the art at the time the invention was made to use a band pass filter instead of the high pass filter, as taught by Watanabe, in the modified communication system and method of Fellows et al., Neidlinger et al. and Kim because a band pass filter blocks noise outside the signal spectrum.

Claim 21 is rejected under 35 U.S.C. 103(a) as being unpatentable over Fellows et al. (U.S. Patent 5,459,607) in view of Neidlinger et al. (U.S. Patent 5,491,575).

Fellows et al. discloses in FIG. 1A and FIG. 1B a digital fiber transmission system comprising a local interface (first location) 2 and a remote location (second location) 4. The local interface transmits a Manchester coded signal having a first clocking frequency to remote location over an optical fiber using a wavelength. The remote location receives the signal and recovers the signal. The remote location converts a NRZ data to Manchester coded of second clock frequency and transmits the second Manchester signal to local interface over the same fiber using same wavelength (see col. 1, lines 39-40). Fellows et al. teaches to use 10 MHz for first clock frequency and 200 MHz for second clock frequency (see col. 5, lines 5-9). The local interface receives the second Manchester signal and converts it to NRZ. The difference between Fellows and the claimed invention is that Fellows et al. does not transmits NRZ from local interface to remote location.

Neidlinger et al. teaches in FIG. 1 a system for transmitting bi-directional communication data over an optical fiber. Neidlinger et al. teaches to transmit NRZ (baseband) signal in one direction and PSK (equivalent to Manchester) modulated signal in the other direction. This allows the use of high-pass filter and low-pass filter at the receiver side to filter out noise due to crosstalk. One of ordinary skill in the art would have motivated to combine the teaching of Neidlinger et al. with the digital fiber transmission system of Fellows et al. because NRZ (baseband) signal and high speed Manchester signal have very little overlap in frequency spectrum and the approach of Neidlinger et al. further reduces crosstalk between signals of different directions. Thus it would have been obvious to one of ordinary skill in the art at the

time the invention was made to transmit NRZ from local interface to remote location, as taught by Neidlinger et al., in the digital fiber transmission system of Fellows et al. because crosstalk between NRZ and high frequency Manchester is small.

(10) Response to Argument

The Appellant argues on page 11 of the Brief "Neidlinger teaches that bidirectional communication (NRZ in a first direction, DPSK in the second direction) is to be accomplished by transmitting at <u>a first wavelength of light</u> in the first direction and transmitting <u>at a second wavelength of light</u> in the second direction." However, the phrases underlined by the Appellant are added by the Appellant. Nowhere does Neidlinger teach a first wavelength and a second wavelength. Neidlinger does teach in col. 1, lines 45-49

the signal transmission proceeding from a decentralized station upstream to the central station can thereby proceed in the same wavelength window.

Neidlinger admits that such passive optical telecommunication systems are known and points out certain deficiencies of such systems. Neidlinger then states in the "Summary of the Invention" Section improvements added to the known systems, such as using different data code and different carrier frequency in each direction. Neidlinger does not mention any improvement related to optical wavelength.

The Appellant also argues on page 12 of the Brief "Fellows specifically teaches that the data is to be transmitted in both directions using Manchester encoding, and further teaches away from transmitting NRZ data." The Examiner disagrees. It is well known in the art that in frequency division multiplexing, if the frequency spectrum of two channels overlaps, there is interference. Fellows teaches in col. 1, lines 50 "The low frequency components from the high

speed data stream will degrade the signal to noise ratio of the low speed data stream and, conversely, the spectrum of the low speed data stream will contribute noise to the high speed data stream." This is illustrated in FIG. 2 of Fellows. When NRZ are used for both upstream and downstream traffic, interference occurs due to overlap of frequency spectrum. Fellows teaches in FIG. 2 that spectrum overlap is reduced if Manchester code is used for both upstream and downstream traffic. It is also clear from FIG. 2 that if Manchester code is used for high speed clock and NRZ is used for low speed clock, overlap is further reduced. That is, even through Fellows does not suggest using NRZ for **both** upstream and downstream traffic. Fellows does not teach away from using Manchester for high speed clock channel and NRZ for low speed clock channel. In fact, Fellows teaches that using Manchester for high speed clock channel and NRZ for low speed clock channel has even less spectrum overlap and, therefore, less interference between the two channels.

The Appellant makes on page 12 of the Brief a conclusive statement "Thus, the system in Neidlinger transmits in the upstream direction at a first wavelength and in the downstream direction at a second wavelength." However, nowhere does Neidlinger teach using different wavelengths for upstream and downstream traffic. Neidlinger does teach using WDM for directional separation. This is similar to the use of optical directional coupler 13 in FIG. 1A of Fellows.

The Appellant states in page 14 of the Brief that Neidlinger teach away from claims 3, 7 16 and 21. To support the argument, the Appellant quotes in page 13 of the Brief col. 1, line 62-col. 2, line 6 of Neidlinger and concludes in page 15 of the Brief "Neidlinger criticizes the prior art teachings of bidirectional, single wavelength baseband transmission systems." The Examiner

disagrees. It is true that Neidlinger criticizes the prior art system and it is true that the prior art system uses single wavelength for both upstream and downstream traffic. However, Neidlinger does not criticize **the use of single wavelength**.

It is helpful to understand the improvements that Neidlinger has made to the prior art systems. Neidlinger teaches in col. 1, lines 53-61 that the prior systems use pulsed PSK for downstream and baseband for upstream. This causes synchronization problem because "a burst-like signal is present in the baseband in the upstream direction, special measures for a fast, time-dependent and amplitude-dependent response of the receiver of the central station are required in general". (See col. 1, line 67-col. 2, line 3.) To overcome this problem, Neidlinger reverses the coding scheme and uses PSK for upstream and baseband for downstream (see col. 2, lines 45-67). Furthermore, the PSK modulation uses a carrier frequency derived from the clock frequency of signal received from central station. This "enables a simple clock regeneration or resynchronization given an appropriately selected carrier frequency, and thus makes a fast as well as amplitude-dependent and time-depend response of the receiver of the central station possible." (See col. 2, lines 48-52.) Neidlinger teaches in col. 1, lines 62-66 that prior art systems separate signals of different transmission directions in the electrical part of the receiver. As a consequence, disturbances due to increased shot noise, amplitude noise of the light source and a possible heterodyne effect are not suppressed. To overcome this problem, Neidlinger uses a WDM for directional separation in the optical domain (see col. 3, lines 55-57). Follows uses the same approach and provides optical directional couplers 13 and 14 in FIG. 1A and FIG. 1B, respectively, to achieve a crosstalk suppression of –50 dB. Finally, Neidlinger teaches a scrambled NRZ baseband signal for downstream to assure a reliable clock regeneration in the

decentralized station (see col. 2, lines 67-col. 3, line 2). These are all the improvements Neidlinger has made to the prior art systems. Neidlinger never mentions using different wavelengths for upstream and downstream traffic as an improvement. That is, Neidlinger does not criticize the use of single wavelength and, therefore, Neidlinger does not teach away from the claimed invention. In re Fulton, 73 USPQ2d 1141 (CA FC 2004).

The Appellant states in page 14 of the Brief that Fellows teach away from claims 3, 7, 16 and 21. The Appellant quotes on page 14 of the Brief col. 1, lines 36-59 and col. 2, lines 26-43 of Fellows to support the argument. The Examiner disagrees. As discussed above, Fellows does not suggest using NRZ for **both** upstream and downstream traffic. Fellows does not criticize using Manchester for high speed clock channel and NRZ for low speed clock channel. A detailed analysis of Fellows' teaching follows.

Fellows teaches in col. 1 lines 40-45

However, such diplexing techniques of equal wavelength digital bit streams require the use of optical couplers to separate the optical signal information bits. Optical couplers provide a certain degree of optical isolation but reflections of standard non-return to zero (NRZ) line coded signals at the fiber interface will substantially degrade the detected signal to noise ratio.

It is understood that even through the downstream and upstream traffic overlap in spectrum, they can be separated because they travel in opposite direction. The problem created by the optical coupler is that it reflects part of the light signal. Of course, the reflection of light by optical coupler occurs regardless of the coding of data carried by the light. The problem is due to the overlap of the spectrum. To solve this problem, Fellows teaches in col. 2 lines 33-39

> *Thus the present invention uses a line code, different from the conventional NRZ line codes, that has a power curve that falls away quickly from the desired center or clock frequency. One such suitable code is a bi-phase or Manchester coding that yields a substantial improvement in received signal to noise ratio of both the low speed and high speed channels.*

Fellows then explains in col. 2, lines 39-43 the reason why Manchester code gives better result.

> *In the case of the high speed channel, the high-frequency effects of the low speed signals are filtered out with very little degradation of the data waveshape, since there is very little energy in the low frequency region of the Manchester coded optical data stream.*

That is, the high speed channel has little energy in the low frequency region and, therefore, a high pass filter can separate out the high speed channel. For this reason, it is desirable to send high speed channel with Manchester coding. Next, Fellows explains the reason for the better result of the low speed channel.

> *In the case of the low speed channel, the noise contribution of the interfering high speed channel is quite low in the bandwidth of the low speed data signal because (i) the energy content is low because energy is falling off rapidly on the low frequency side of the spectrum and (ii) the power spectrum density (PSD) of the high speed channel is low due to the high bit rate, i.e., the energy is spread over a large spectrum Thus, a small fraction of the total energy in the interfering high speed channel actually contributes to the degradation of the low speed channel signal to noise ratio.*

Again, the improvement is due to the use of Manchester coding for the high speed channel.

After fully analyzing the teaching of Fellows, the Examiner concludes that the improvement that Fellows claims is due to the use of Manchester coding for the **high speed channel**. It is unnecessary to use Manchester coding for low speed channel. In fact, Fellows suggests in FIG. 2 that using Manchester for high speed clock channel and NRZ for low speed clock channel has even less spectrum overlap and, therefore, less interference between the two channels. Therefore, Fellows does not teach away the claimed invention. In re Fulton, 73 USPQ2d 1141 (CA FC 2004).

The Appellant argues on page 17 of the Brief that there is no motivation to combine the references. The Examiner disagrees. The examiner recognizes that obviousness can only be established by combining or modifying the teachings of the prior art to produce the claimed invention where there is some teaching, suggestion, or motivation to do so found either in the references themselves or in the knowledge generally available to one of ordinary skill in the art. See *In re Fine*, 837 F.2d 1071, 5 USPQ2d 1596 (Fed. Cir. 1988) and *In re Jones*, 958 F.2d 347, 21 USPQ2d 1941 (Fed. Cir. 1992). In this case, Fellows suggests in FIG. 2 that if NRZ is used for baseband transmission, overlap of upstream and downstream channels is minimized and interference is reduced; Neidlinger teaches in col. 2, line 65-col. 3, line 2 that in downstream direction, a NRZ baseband signal, particular a scrambled NRZ assures a reliable clock regeneration in the decentralized stations. One of ordinary skill in the art would have been motivated to combine the teachings of Neidlinger with the communication system of Fellows because of the advantages taught by the references themselves.

The Appellant argues on page 17 of the Brief that the rejection is based on impermissible hindsight. The Examiner disagrees. It must be recognized that any judgment on obviousness is

in a sense necessarily a reconstruction based upon hindsight reasoning. But so long as it takes into account only knowledge which was within the level of ordinary skill at the time the claimed invention was made, and does not include knowledge gleaned only from the applicant's disclosure, such a reconstruction is proper. See *In re McLaughlin*, 443 F.2d 1392, 170 USPQ 209 (CCPA 1971).

Regarding claims 12, 17 and 20, the Appellant argues based on the same reasons, which have been addressed above by the Examiner in regard to claims 3, 7, 16 and 21.

(11) Related Proceeding(s) Appendix

No decision rendered by a court or the Board is identified by the examiner in the Related Appeals and Interferences section of this examiner's answer.

For the above reasons, it is believed that the rejections should be sustained.

Respectfully submitted,

skl Sk

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